

The Directed Shark Gillnet Fishery:
Catch and Bycatch, 2005

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Introduction

Observations of the catch and bycatch from the east Florida-Georgia shark drift gillnet fishery are required by law, and reports are prepared annually (i.e. Carlson et al., 2005 and references therein). The Atlantic Large Whale Take Reduction Plan and the Biological Opinion issued under Section 7 of the Endangered Species Act mandate 100% observer coverage of the southeast shark drift gillnet fishery during the right whale calving season (15 Nov-1 Apr). Outside the right whale calving season (1 Apr-14 Nov), an interim final rule (March 30, 2001; 66 FR 17370) to the Fishery Management Plan for Highly Migratory Species (i.e. tunas, billfish, sharks; NMFS, 1999) established a level of observer coverage for these vessels equal to that which would attain a sample size needed to provide estimates of sea turtle or marine mammal interactions with an expected coefficient of variation of 0.3.

Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gillnet gear. These vessels were not previously subject to observer coverage because they either were targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks.

Methods

Observer protocol

During the 100% observer requirement period, observers were deployed in ports where the drift gillnet vessels were currently active. Observers board all drift or strike vessels for all trips during this time period. Outside the 100% requirement period, vessels were selected randomly from a pool of vessels that (1) had a current directed shark permit, (2) reported fishing for sharks with gillnet gear, and (3) reported greater than 25% of landings from sharks during the previous year.

Selection letters requiring observer coverage were issued monthly by the SEFSC observer coordinator beginning on 1 April 2005. The last assessment of sample size found that a 33.8% level of coverage is required to attain a sample size needed to provide estimates of a sea turtle or marine mammal interaction with an expected coefficient of variation of 0.3 (Carlson and Baremore, 2002). After the fisher made initial contact with the observer coordinator, an observer was deployed to the port where the vessel was currently active. As trips are generally daily, the observer covered the vessel for up to 10-14 days to attain a sufficient level of coverage.

Observations were made as the net was hauled aboard. The observer remained about 1-5 m forward of the stern of the vessel in a position with an unobstructed view and recorded species, numbers and lengths (± 30 cm) of sharks and other species caught as they were suspended in the net just after passing over the power roller. Weights (in kg) were estimated from these estimated lengths using length-weight relationships provided Kohler et al. (1998) and Carlson (unpublished data). When species identification was questionable, the crew stopped the reel so that the observer could examine the animal(s) for positive identification. Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. When time permitted after the haulback was complete, observers randomly measured sharks when the vessel was returning to port. Fork length (FL, measured on a straight line) and sex were determined for each shark. Biological samples (e.g. vertebrae, reproductive organs, stomach) were removed and placed on ice after collection. Data were submitted to the NMFS/SEFSC Sustainable Fisheries Division on a weekly basis. The data were entered by SEFSC staff,

examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with observer contract staff to resolve any questions.

Results and Discussion

Drift gillnet fishery

A total of 31 drift gillnet sets on 30 trips were observed from 4 vessels. The distribution of observed drift gillnet fishing effort is illustrated in Figure 1. Drift gillnet vessels carried nets ranging in length from 182 to 2645 m, depths of 12 m and stretched mesh sizes from 12.7 to 25.4 cm. The most frequently used mesh size was 12.7 cm. For all observed drift gillnet sets, set duration averaged 0.3 hrs (± 0.2 S.D.). Sets were made in waters averaging 21.5 m (± 6.4 S.D.) deep. Hauls averaged 2.9 hrs (± 1.4 S.D.). The entire fishing process (time net was first set until time haulback was completed) averaged 10.2 hrs (± 2.6 S.D.).

Observed drift gillnet catches

Total observed catch composition was 89.1% sharks, 10.5% teleosts, 0.4% rays, and 0.03% protected resources (i.e. marine mammals, sea turtles, smalltooth sawfish). Three species of sharks made up 90.8% (by number) of the observed shark catch (Table 1). These species were Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, blacktip shark, *Carcharhinus limbatus*, and bonnethead, *Sphyrna tiburo*. By weight, the shark catch was made up of Atlantic sharpnose shark, (47.9%), blacktip shark (26.9%), and spinner shark, *Carcharhinus brevipinna* (7.0%).

Two species of teleosts made up 81.3% by number of the overall non-shark species. These species were little tunny, *Euthynnus alletteratus* (49.0%) and king mackerel, *Scomberomorus cavalla* (32.3%) (Table 2).

For incidental drift gillnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) were Atlantic moonfish, *Selene setapinnus* (100.0%), Atlantic sailfish, *Istiophorus platypterus* (100.0%), and king mackerel (53.3%). Cownose ray, *Rhinoptera bonasus*, had the highest proportion discarded alive (73.7%).

Strike gillnet fishery

A total of 7 strike gillnet vessels were observed making 33 sets on 53 trips. Reasons for not striking for sharks included the inability to locate the school of sharks, sharks located in state waters, and poor weather conditions. The distribution of observed strike gillnet fishing effort is illustrated in Figure 1.

Vessels strike gillnetting for sharks carried nets ranging from 13.7 to 1368 m long and 21 to 30 m deep. Stretched mesh sizes ranged from 22.9 to 30.4 cm. The most frequently used mesh size was 22.9 cm. Setting of the gear averaged 0.1 hrs (± 0.1 S.D.) and was made in water depths averaging 17.8 m (± 6.1 S.D.). Hauls averaged 0.9 hrs (± 0.7 S.D.). The entire strike gillnetting process (time net was first set until time haulback was completed) averaged 3.7 hrs (± 5.3 S.D.).

Observed strike gillnet catches

Total observed catch composition (percent of numbers caught) for vessels utilizing strike gillnet techniques was 99.8% sharks, 0.1% teleosts, 0.1% rays and 0.02% protected resources (Table 3). The blacktip shark and finetooth shark, *Carcharhinus isodon*, made up 79.8% and 82.6% of the shark catch by number and weight, respectively. Five species of teleosts and rays made up the overall non-shark species.

Sink gillnet fishery

A total of 88 sets were observed on 30 trips from 8 vessels in 2005. No estimate of overall effort is available and this information should be considered preliminary until more trips can be observed. Observed sink gillnet fishing effort is given in Figure 1. Vessels fishing sink gillnet gear on the bottom and targeting other non-shark species are some of the same vessels in the shark drift gillnet fishery. Vessels in both fisheries are generally 6.1-19.8 m long. While some vessels are equipped with diesel engines and hydraulic-powered net retrieval systems, other smaller vessels have outboard motors and the net is set and retrieved by hand.

All sink gillnets were fished on the bottom regardless of target species. This differs from drift and strike net techniques. When a vessel fishes a drift gillnet, the vessel sets a gillnet in a straight line off the stern. The net soaks or fishes at the surface for a period of time, is inspected at various occasions during the soak, and is then hauled onto the vessel when the captain or crew feels the catch is adequate. When a vessel fishes a strike gillnet, the vessel takes it's gillnet and encircles a school of sharks. The net generally fishes from the surface to the bottom to prevent sharks from escaping either under or over the net. This is done usually during daylight hours, using visual sighting of shark schools from the vessel and or a spotter plane. The gear is hauled back onto the vessel without much soak time. Some vessels also deploy strike gillnets behind shrimp trawls as the vessel is hauling in its trawl and processing the catch and discarding the bycatch.

The major differences within sink gillnet gear are related to the target species. Three species groups were observed targeted in 2005; shark, kingfish, *Menticirrhus* spp., and spanish mackerel, *Scomberomorus maculatus*. Bottom gillnets generally are weighted with 111 to 277 kg of leadline and have floats 12.7 to 15.2 cm in diameter every 1.8 m. The net is set off the stern of the vessel and checked by hand every 15 to 20 minutes. Large polyball floats are located at either end of the gear with droplines between 6.1 and 18.2 m, depending on the water depth (average depth nets were fished was 10.9-19.1 m). When targeting kingfish, vessels would sometimes fish several gillnets at once.

When vessels targeted kingfish or spanish mackerel, preliminary observations indicated vessels used nets ranging from 68 to 912 m long and 1 to 9 m deep. Stretched mesh sizes ranged from 6.4 to 12.7 cm with 7.6 cm as the most frequently used mesh. Setting of the gear averaged 0.1 hrs (± 0.1 S.D.) and hauls averaged 0.5 hrs (± 0.3 S.D.). The entire process (time net was first set until time haulback was completed) averaged 6.5 hrs (± 7.1 S.D.).

Sink gillnet gear that was used for targeting sharks was 137 to 1824 m long and 2 to 8 m deep. Stretched mesh sizes were from 7.3 to 20.3 cm. The mesh size most frequently used was 17.8 cm. Nets were set in an average depth of 18.9 m (± 6.0 S.D.). Setting of the gear averaged 0.1 hrs (± 0.1 S.D.) and hauls averaged 1.0 hrs (± 0.8 S.D.). The entire process (time net was first set until time haulback was completed) averaged 5.1 hrs (± 4.9 S.D.). More information on these various fishing techniques and target species will be obtained in 2006, as funds permit.

Observed sink gillnet catches

For vessels targeting sharks utilizing sink gillnet gear, total observed catch composition was 82.5% sharks, 14.1% teleosts, 3.4% rays and 0.04% protected resources (Table 4). By number and weight, shark catches were made up primarily of Atlantic sharpnose shark and blacktip shark. Southern kingfish, *Menticirrhus americanus*, Atlantic guitarfish, *Rhinobatos*

lentiginosus, gulf flounder, *Paralichthys albigutta*, whitebone porgy, *Calamus leucosteus*, and crevalle jack, *Caranx hippos*, composed most of the non-shark catches.

Total observed catch composition for vessels targeting non-HMS species were 6.2% sharks, 93.7% teleosts, and 0.1% rays (Table 5). The Atlantic sharpnose shark was the most abundant shark caught (81.4% of shark catch). Kingfish and Spanish mackerel comprised 90.4% of the teleost catch.

Average size

Observers measured 4.4% of the total catch of sharks when vessels targeted sharks using any type of gillnet gear. By species, 100% of bull shark, 21.3% of scalloped hammerhead shark, 5.5% of Atlantic sharpnose shark, 5.2% of spinner shark, 4.7% of bonnethead, 3.8% of blacknose shark, 3.1% of blacktip shark, and 1.9% of finetooth shark were measured. Observers measured 12.8% of sharks on those trips not targeting sharks. Average sizes based on these measurements for both target species are found in Table 6.

Protected resources interactions

Interactions with protected resources were observed for vessels fishing with drift, strike, and sink gillnet gear in 2005 (Table 7). Four loggerhead sea turtles were observed caught in drift gillnet gear. Three were released alive and one was released injured and assumed to be dead. One leatherback turtle was also caught in drift gillnet gear but was released alive. Interactions (loggerhead sea turtle, released alive) were observed when a vessel was strike netting and in the sink gillnet fishery when the vessel was targeting sharks.

References

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Table 1. Total directed drift gillnet shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2005.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	9999	98.5	0.0	1.4
<i>Carcharhinus limbatus</i>	Blacktip shark	2533	97.8	0.9	1.3
<i>Sphyrna tiburo</i>	Bonnethead	562	98.4	0.0	1.6
<i>Carcharhinus brevipinna</i>	Spinner shark	453	98.2	0.7	1.1
<i>Carcharhinus isodon</i>	Finetooth shark	413	95.6	0.0	4.4
<i>Carcharhinus acronotus</i>	Blacknose shark	397	99.5	0.0	0.5
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	59	96.6	0.0	3.4
<i>Sphyrna mokarran</i>	Great hammerhead shark	9	77.8	0.0	22.2
<i>Carcharhinus falciformis</i>	Silky shark	2	100.0	0.0	0.0
<i>Carcharhinus leucas</i>	Bull shark	1	100.0	0.0	0.0
<i>Carcharodon carcharias</i>	White shark	1	0.0	0.0	100.0

Table 2. Total drift gillnet teleost and ray bycatch by species in order of decreasing abundance and species disposition for all observed trips, 2005.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Euthynnus alletteratus</i>	Little tunny	862	100.0	0.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	568	46.0	0.7	53.3
<i>Sphyrna barracuda</i>	Great barracuda	79	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	75	88.0	1.3	10.7
<i>Rhinoptera bonasus</i>	Cownose ray	57	0.0	73.7	26.3
<i>Selene setapinnis</i>	Atlantic moonfish	34	0.0	0.0	100.0
<i>Istiophorus platypterus</i>	Atlantic sailfish	25	0.0	0.0	100.0
<i>Pomatomus saltatrix</i>	Bluefish	23	100.0	0.0	0.0
<i>Megalops atlanticus</i>	Tarpon	7	0.0	0.0	100.0
<i>Aetobatus narinari</i>	Spotted eagle ray	6	0.0	100.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	5	100.0	0.0	0.0
Echeneididae	Remora	4	0.0	100.0	0.0
<i>Coryphaena hippurus</i>	Dolphin	4	100.0	0.0	0.0
<i>Thunnus atlanticus</i>	Blackfin tuna	3	100.0	0.0	0.0
<i>Manta birostris</i>	Manta ray	3	0.0	100.0	0.0

<i>Acanthocybium solanderi</i>	Wahoo	2	100.0	0.0	0.0
<i>Caranx crysos</i>	Blue runner	1	100.0	0.0	0.0
<i>Caranx hippos</i>	Crevalle jack	1	100.0	0.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	100.0	0.0	0.0

Table 3. Total directed strike gillnet shark catch and bycatch by species and species disposition in order of decreasing abundance for all observed trips, 2005.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip shark	3167	68.0	0.0	32.0
<i>Carcharhinus isodon</i>	Finetooth shark	1556	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner shark	671	100.0	0.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose shark	519	100.0	0.0	0.0
<i>Megalops atlanticus</i>	Tarpon	5	0.0	0.0	100.0
<i>Rhinoptera bonasus</i>	Cownose ray	3	0.0	33.3	66.7
<i>Manta birostris</i>	Manta ray	2	0.0	100.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	2	0.0	0.0	100.0
<i>Aetobatus narinari</i>	Spotted eagle ray	2	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	1	100.0	0.0	0.0
<i>Carcharhinus leucas</i>	Bull shark	1	100.0	0.0	0.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	1	100.0	0.0	0.0

Table 4. Total directed sink gillnet shark catch and bycatch by species and species disposition in order of decreasing abundance for all observed trips, 2005.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	1013	99.5	0.0	0.5
<i>Sphyrna tiburo</i>	Bonnethead	603	98.3	0.0	1.7
<i>Carcharhinus limbatus</i>	Blacktip shark	141	27.7	2.8	69.5
<i>Carcharhinus acronotus</i>	Blacknose shark	116	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	69	100.0	0.0	0.0
<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish	67	100.0	0.0	0.0
<i>Paralichthys albigutta</i>	Gulf flounder	26	88.5	11.5	0.0
<i>Calamus leucosteus</i>	Whitebone porgy	24	87.5	12.5	0.0
<i>Caranx hippos</i>	Crevalle jack	24	100.0	0.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	24	100.0	0.0	0.0

<i>Pomatomus saltatrix</i>	Bluefish	20	90.0	0.0	10.0
<i>Paralichthys lethostigma</i>	Southern flounder	18	100.0	0.0	0.0
<i>Selene setapinnis</i>	Atlantic moonfish	16	93.8	6.3	0.0
<i>Chaetodipterus faber</i>	Atlantic spadefish	15	13.3	46.7	40.0
<i>Micropogonias undulatus</i>	Atlantic croaker	14	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner shark	12	16.7	33.3	50.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	12	91.7	0.0	8.3
<i>Bagre marinus</i>	Gafftop catfish	10	10.0	0.0	90.0
<i>Lutjanus campechanus</i>	Red snapper	10	10.0	50.0	40.0
<i>Euthynnus alletteratus</i>	Little tunny	9	100.0	0.0	0.0
<i>Galeocerdo cuvier</i>	Tiger shark	9	22.2	66.7	11.1
<i>Raja eglanteria</i>	Clearnose skate	9	77.8	22.2	0.0
Sphyrnaeidae	Barracuda	9	100.0	0.0	0.0
<i>Synodus foetens</i>	Inshore lizardfish	8	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	6	66.7	16.7	16.6
<i>Lactophrys quadricornis</i>	Scrawled cowfish	5	20.0	80.0	0.0
<i>Calamus proridens</i>	Littlehead porgy	4	75.0	25.0	0.0
<i>Centropristis striata</i>	Black sea bass	4	0.0	50.0	50.0
<i>Cynoscion regalis</i>	Spotted seatrout	4	100.0	0.0	0.0
<i>Elops saurus</i>	Ladyfish	4	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	3	100.0	0.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	3	0.0	100.0	0.0
<i>Calamus bajonado</i>	Jolthead porgy	2	100.0	0.0	0.0
<i>Haemulon aurolineatum</i>	Tomtate	2	50.0	0.0	50.0
<i>Haemulon album</i>	White margate	2	0.0	0.0	100.0
<i>Rhinoptera bonasus</i>	Cownose ray	2	0.0	100.0	0.0
<i>Aetobatus narinari</i>	Spotted eagle ray	1	0.0	100.0	0.0
<i>Caranx crysos</i>	Blue runner	1	100.0	0.0	0.0
<i>Carcharhinus falciformis</i>	Silky shark	1	0.0	100.0	25.9
<i>Carcharhinus plumbeus</i>	Sandbar shark	1	0.0	0.0	100.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	1	0.0	100.0	0.0
<i>Cynoscion nothus</i>	Silver seatrout	1	0.0	0.0	100.0
Echeneididae	Remora	1	0.0	100.0	0.0

<i>Ginglymostoma cirratum</i>	Nurse shark	1	0.0	100.0	0.0
<i>Haemulon sciurus</i>	Bluestriped grunt	1	100.0	0.0	0.0
<i>Hippocampus erectus</i>	Lined seahorse	1	0.0	100.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	100.0	0.0	0.0
<i>Lutjanus vivanus</i>	Silk snapper	1	0.0	0.0	100.0
<i>Mycteroperca bonaci</i>	Black grouper	1	0.0	100.0	0.0
<i>Mycteroperca phenax</i>	Scamp	1	0.0	0.0	100.0
<i>Neomerinthe hemingwayi</i>	Spinycheek scorpionfish	1	0.0	100.0	0.0
<i>Ogcocephalus radiatus</i>	Polka-dot batfish	1	0.0	0.0	100.0
<i>Peprilus alepidotus</i>	Harvestfish	1	0.0	0.0	100.0
<i>Pogonias cromis</i>	Black drum	1	0.0	100.0	0.0
<i>Rhomboplites aurorubens</i>	Vermilion snapper	1	0.0	100.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	1	100.0	0.0	0.0
<i>Seriola dumereli</i>	Amberjack	1	100.0	0.0	0.0

Table 5. Total observed sink gillnet catches by species and species disposition in order of decreasing abundance for all trips not targeting sharks, 2005.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Menticirrhus</i> spp.	Kingfish	14702	89.2	0.0	10.8
<i>Scomberomorus maculatas</i>	Spanish mackerel	959	98.7	0.1	1.1
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	949	39.1	8.6	52.3
<i>Leiostomus xanthurus</i>	Spot	373	94.1	0.0	5.9
<i>Larimus fasciatus</i>	Banded drum	318	72.6	6.6	20.8
<i>Pomatomus saltatrix</i>	Bluefish	289	65.0	0.7	34.3
<i>Menticirrhus americanus</i>	Southern kingfish	239	98.7	0.0	1.3
<i>Cynoscion regalis</i>	Spotted seatrout	195	98.5	0.5	1.0
<i>Sphyrna tiburo</i>	Bonnethead	156	61.5	10.3	28.2
<i>Brevoortia smithi</i>	Yellowfin menhaden	117	26.5	9.4	64.1
<i>Menticirrhus littoralis</i>	Gulf kingfish	82	100.0	0.0	0.0
<i>Caranx crysos</i>	Blue runner	64	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	60	0.0	28.3	71.7
<i>Peprilus burti</i>	Gulf butterfish	54	100.0	0.0	0.0
<i>Peprilus</i>	Butterfish	35	100.0	0.0	0.0

<i>triacanthus</i>					
<i>Selene setapinnis</i>	Atlantic moonfish	30	0.0	0.0	100.0
<i>Carcharhinus limbatus</i>	Blacktip shark	22	54.5	36.4	9.1
<i>Cynoscion nothus</i>	Silver seatrout	21	0.0	0.0	100.0
<i>Caranx hippos</i>	Crevalle jack	19	100.0	0.0	0.0
<i>Raja eglanteria</i>	Clearnose skate	15	100.0	0.0	0.0
<i>Peprilus alepidotus</i>	Harvestfish	14	100.0	0.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	13	100.0	0.0	0.0
<i>Paralichthys lethostigma</i>	Southern flounder	13	100.0	0.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	12	8.3	75.0	16.7
<i>Bagre marinus</i>	Gafftop catfish	11	18.2	0.0	81.8
<i>Brevoortia tyrannus</i>	Atlantic menhaden	10	80.0	20.0	0.0
<i>Chaetodipterus faber</i>	Atlantic spadefish	10	0.0	0.0	100.0
<i>Carcharhinus acronotus</i>	Blacknose shark	9	100.0	0.0	0.0
<i>Centropristis striata</i>	Black sea bass	7	0.0	0.0	100.0
<i>Euthynnus alletteratus</i>	Little tunny	7	100.0	0.0	0.0
<i>Seriola vomer</i>	Lookdown	6	0.0	50.0	50.0
<i>Micropogonias undulatus</i>	Atlantic croaker	5	60.0	0.0	40.0
<i>Myliobatis freminvillii</i>	Bullnose ray	5	0.0	80.0	20.0
<i>Scomberomorus cavalla</i>	King mackerel	5	0.0	40.0	60.0
<i>Synodus foetens</i>	Nearshore lizardfish	5	0.0	20.0	80.0
<i>Elops saurus</i>	Ladyfish	5	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	4	75.0	0.0	25.0
<i>Orthopristis chrysoptera</i>	Pigfish	3	100.0	0.0	0.0
<i>Prionotus spp.</i>	Searobin	3	0.0	100.0	0.0
<i>Haemulon aurolineatum</i>	Tomtate	2	0.0	0.0	100.0
<i>Carcharhinus brevipinna</i>	Spinner shark	2	50.0	0.0	50.0
<i>Citharichthys spilopterus</i>	Bay whiff	2	100.0	0.0	0.0
<i>Aetobatus narinari</i>	Spotted eagle ray	1	0.0	100.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
Echeneididae	Remora	1	0.0	100.0	0.0
<i>Equetus umbrosus</i>	Cubbyu	1	0.0	0.0	100.0
<i>Galeocerdo cuvier</i>	Tiger shark	1	0.0	100.0	0.0
<i>Haemulon album</i>	White margate	1	0.0	0.0	100.0

<i>Mustelus canis</i>	Smooth dogfish	1	0.0	0.0	100.0
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Table 6. Average size of sharks measured for all observed trips by target species, 2005.

Target	Species	N	Size (cm FL)	S.D.	Percentage measured of the catch by species
Shark	Atlantic sharpnose shark	605	75.5	8.5	5.5
	Blacktip shark	180	119.0	28.8	3.1
	Spinner shark	58	122.9	28.9	5.2
	Finetooth shark	38	123.6	8.8	1.9
	Blacknose	39	105.3	12.2	3.8
	Scalloped hammerhead shark	13	77.4	11.8	21.3
	Bonnethead	55	82.4	11.9	4.7
	Bull shark	2	121.5	60.1	100.0
Kingfish/Spanish mackerel	Atlantic sharpnose shark	102	71.1	13.6	10.7
	Bonnethead	39	73.2	19.4	25.0
	Finetooth shark	8	121.6	14.9	61.5

Table 7. Protected species interactions in the shark gillnet fishery for all observed trips, 2005.

Landing date	Latitude Longitude	Species	Target	Gear	Disposition
01/27/05	27° 17.1' N 080° 09.2' W	<i>Caretta caretta</i>	Shark	Strike gillnet	Released alive
02/05/05	27° 29.7' N 080° 10.3' W	<i>Caretta caretta</i>	Shark	Drift gillnet	Release alive
02/09/05	27° 27.8' N 080° 07.1' W	<i>Caretta caretta</i>	Shark	Drift gillnet	Release alive
02/15/05	27° 26.4' N 080° 09.3' W	<i>Dermochelys coriacea</i>	Shark	Drift gillnet	Release alive
02/21/05	27° 40.9' N 080° 18.5' W	<i>Caretta caretta</i>	Shark	Drift gillnet	Release alive
02/21/05	27° 40.9' N 080° 18.5' W	<i>Caretta caretta</i>	Shark	Drift gillnet	Released injured, assumed dead
09/24/05	27° 23.9' N 080° 06.5' W	<i>Caretta caretta</i>	Shark	Sink gillnet	Released alive

Figure 1. Distribution of observed strike, sink, and drift gillnet sets, 2005.

